
Configuring remote peripheral equipment

Remote peripheral equipment (RPE) allows you to locate peripheral equipment (PE) at a site up to 112.7 km (70 miles) from common equipment (CE) by converting multiplexed loop signals to a form compatible with T-1 type digital transmission. Any medium that conforms to the DS-1 format (1.544 Mbps), including digital microwave radio and fiber optic transmission, may be used to link local and remote sites.

NT8D47 RPE Modules can be configured in:

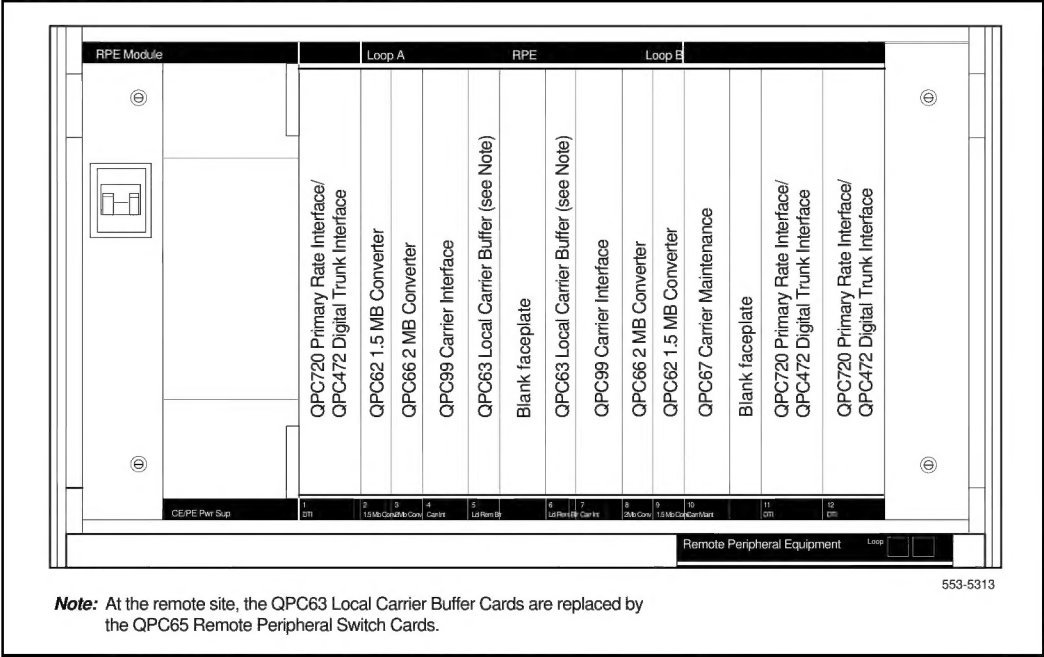
- an existing column
RPE Modules can be installed at any level in a column.
- a stand-alone RPE column
The column consists of the RPE Module, a peripheral equipment module, the top cap, and the pedestal.

RPE Modules house the following cards (see [Figure 135](#)):

- slots 2 and 9: QPC62F (or later vintage) 1.5 MB Converter Card
- slots 3 and 8: QPC66E (or later vintage) 2 MB Converter Card
- slots 4 and 7: QPC99F (or later vintage) Carrier Interface Card
- slots 5 and 6: local end—QPC63F (or later vintage) Local Carrier Buffer Card; remote end—QPC65D (or later vintage) Remote Peripheral Switch Card
- slot 10: QPC67E (or later vintage) Carrier Maintenance Card

Note: QPC720 Primary Rate Interface (PRI) and QPC472 Digital Trunk Interface (DTI) Cards can be used in slots 1, 11, and 12, but these cards are not related to the RPE function.

Figure 135
Card slots in the NT8D47 RPE Module

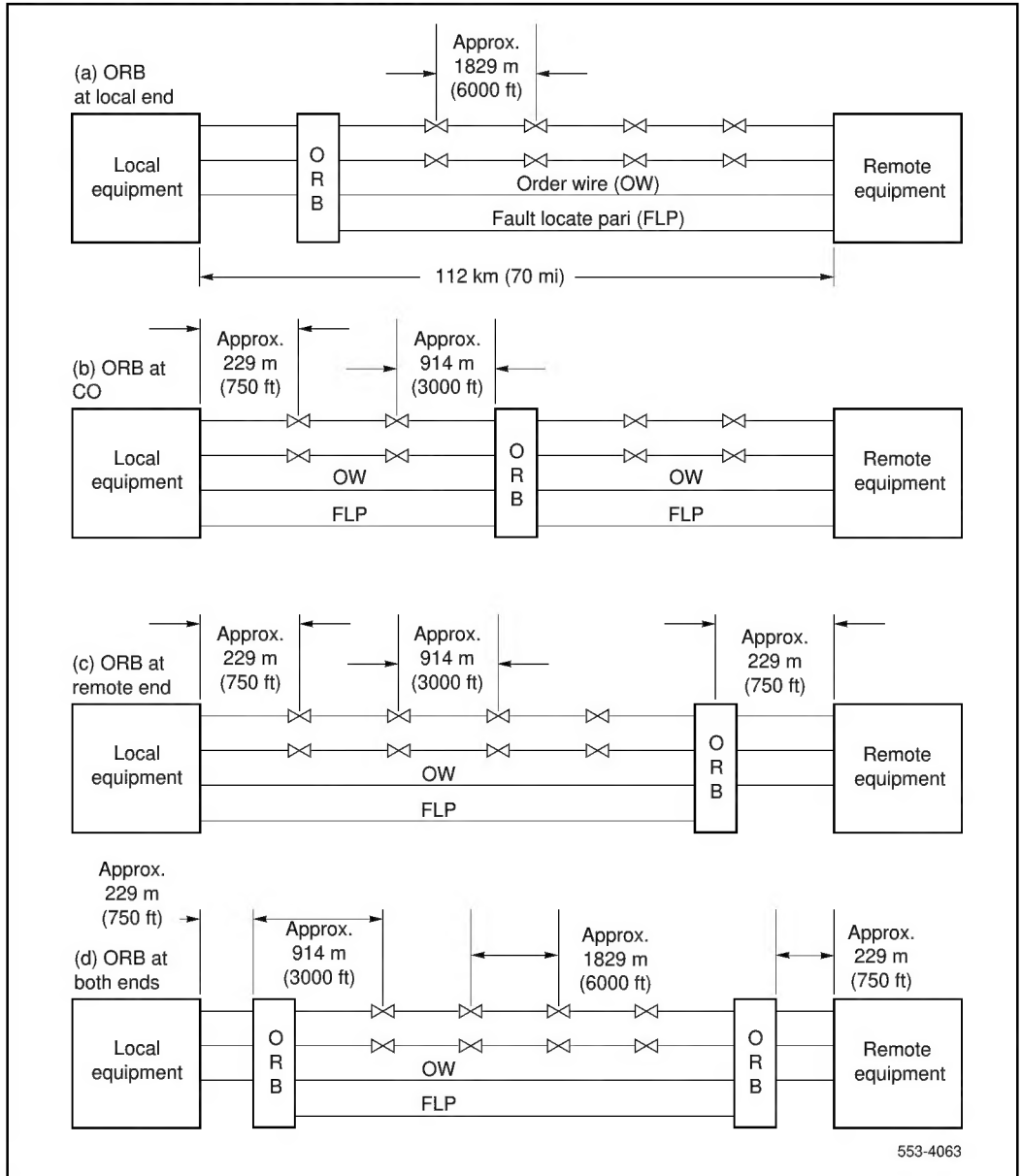


In an RPE configuration, the common equipment site is the “local” site; the site without common equipment is the “remote” site.

If the distance between local and remote sites is more than 726 m (2500 ft), an office repeater bay (ORB) is required to effectively isolate the carrier span from the Meridian 1 equipment (see [Figure 136](#)). An ORB provides:

- span line powering
- error monitoring
- fault-locate system access
- order-wire termination with DID access
- line looping

Figure 136
Possible ORB locations in the RPE system



The local and remote sites are connected through two 50-pin connectors, C and D, on the rear of the backplane in RPE Modules (see [Figure 137](#)). Two 25-pair cables connect the C and D connectors to the input/output (I/O) panel of the RPE Module (see [Figure 138](#)).

At the local site, the RPE Module and the Network Module are connected through 36-pin connectors, E and F, on the rear of the RPE backplane (see [Figure 137](#)). Two 18-pair cables connect the E and F connectors to the faceplate connectors on a QPC414 Network Card in the Network Module.

At the remote site, the RPE Module and PE Modules are connected through backplane connectors E and F (see [Figure 137](#)). Eighteen-pair cables connect the E and F connectors to the faceplate connectors on QPC659 Dual Loop Peripheral Buffer (DLB) Cards in two PE Modules (the PE Modules support only single loop mode).

The RPE Module accommodates two network loops. The number of RPE Modules required per system depends on the number of connections required at the remote site. If only one network loop is required, only half of the card slots in the module are used. However, the QPC67 Carrier Maintenance Card is always required.

Note: The connector used (E or F) determines which card slots are used. Connector F supports slots 1 through 5. Connector E supports slots 6 through 10.

Figure 137
RPE Module backplane

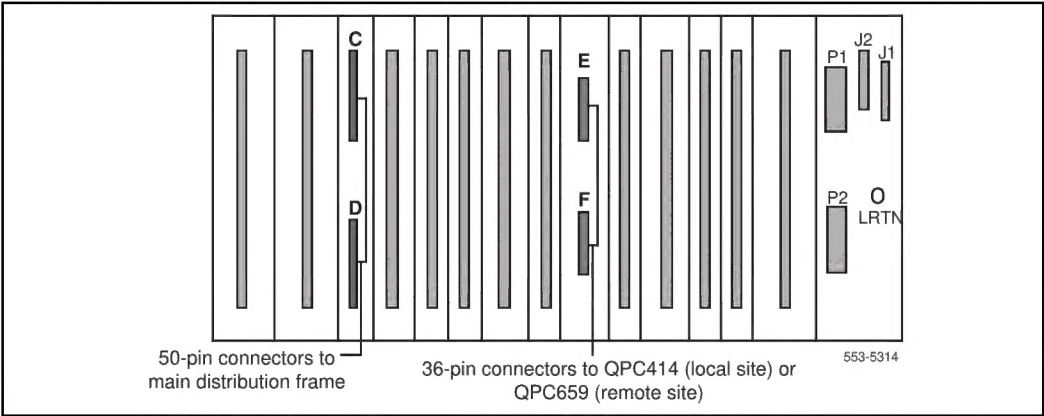
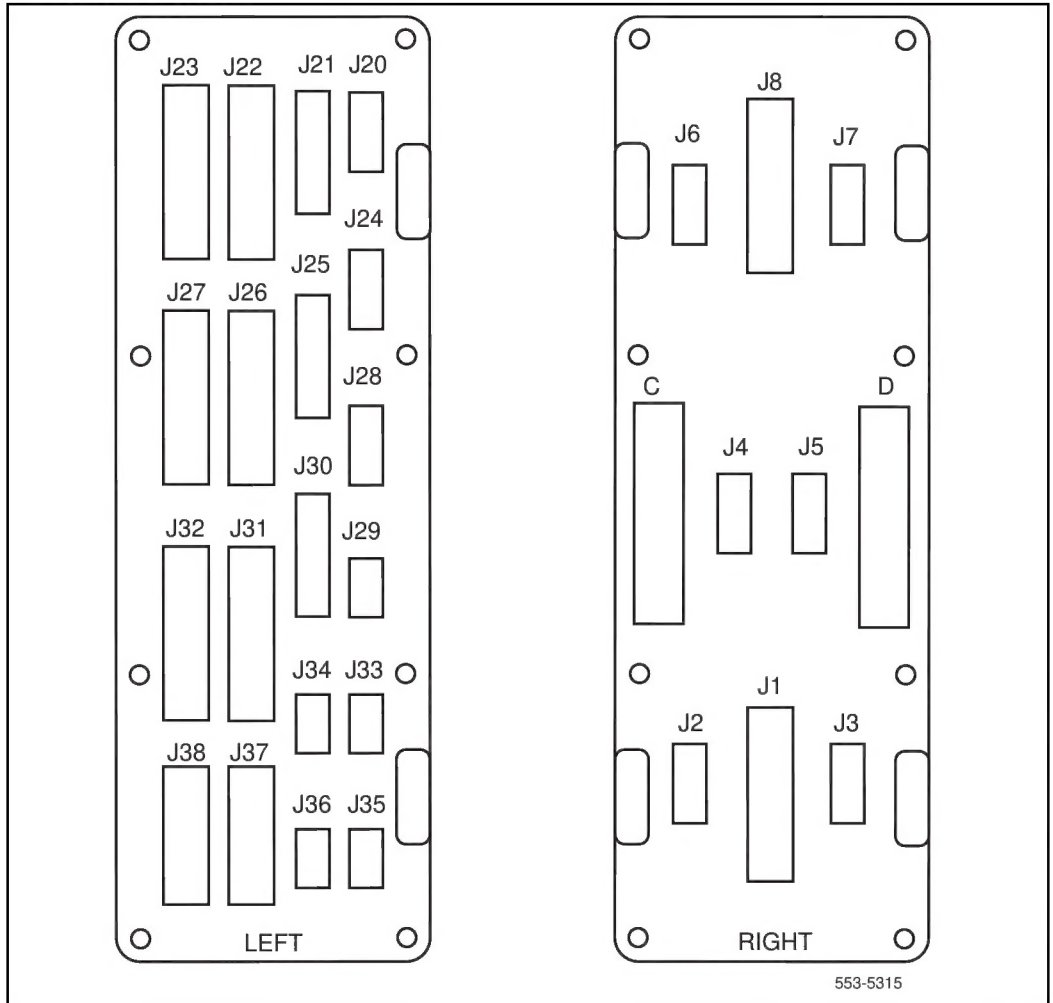


Figure 138
Input/output panel



Installing RPE

Refer to [Figure 139](#), [Figure 140](#), and [Figure 141](#) throughout this procedure.

Local RPE installation

1 Install RPE Modules:

- To install an RPE Module in an existing column, follow the appropriate procedure in “Adding a module to a column” on page 389.
- To install a stand-alone RPE column, follow the procedures in “Initial Meridian 1 installation” on page 11.

2 **For local RPE to RPE installation**, connect an NT8D85 cable from connector E or F on the backplane of the RPE Module to a faceplate connector on the QPC414 Network Card in the network module. Refer to [Figure 139](#).

Note: If two network loops are required, attach both E and F to the two faceplate connectors on the QPC414 Network Card.

3 **For local RPE to SL-1 cabinet installation** connect the following cables and refer to [Figure 140](#):

- Connect the NT8D86 cable from connector E or F on the backplane of the RPE Module to the I/O panel connector on the RPE Module.
- Connect the NT8D73 shielded cable from the I/O panel on the RPE Module to the I/O connector housing on the SL-1 cabinet.
- Connect the NT9J96 cable from the I/O connector housing on the SL-1 cabinet to a faceplate connector on the QPC414 Network Card in the network module.

Note: If two network loops are required, attach both E and F to the two faceplate connectors on the QPC414 Network Card.

- 4 For local RPE to a collocated Meridian 1 installation** connect the following cables and refer to [Figure 141](#):
- Connect the NT8D86 cable from connector E or F on the backplane of the RPE Module to the I/O panel connector on the RPE Module.
 - Connect the NT8D73 shielded cable from the I/O panel on the RPE Module to the I/O panel connector on the Network Module of the Meridian 1 column.
 - Connect the NT8D86 cable from the I/O panel on the Network Module to a faceplate connector on the QPC414 Network Card in the network module. Refer to [Figure 141](#).

Note: If two network loops are required, attach both E and F to the two faceplate connectors on the QPC414 Network Card.

Remote RPE installation

- 5 For remote RPE installation**, connect an NT8D85 cable from connector E or F on the backplane of the RPE Module to faceplate connector LPX on the QPC659 DLB Card in a PE Module.
- Note:** Each DLB card can serve only one RPE loop.
- 6** Connect two NT9J94AB cables from connectors C and D on the backplane of the RPE Module to cut-outs C and D on the I/O panel.
- 7** Connect two standard 25-pair A25B connector cables (tip and ring Amphenol cables) from cut-outs C and D on the I/O panel to the main distribution frame (MDF).
- 8** Check the option switch settings on the QPC62, QPC66, and QPC99 cards. Check the switch settings on the PRI/DTI cards, if equipped. See [“RPE option switch settings” on page 378](#).
- 9** Inspect the equipment:
- Set all circuit breakers to OFF.
 - Lock all cards into their assigned slots.
 - Secure all cable connectors.

- 10 For remote RPE installation**, set all system monitors as slaves. See [“RPE option switch settings” on page 378.](#)
- 11** Perform the acceptance tests at the end of this chapter.

Figure 139
Remote peripheral equipment cabling

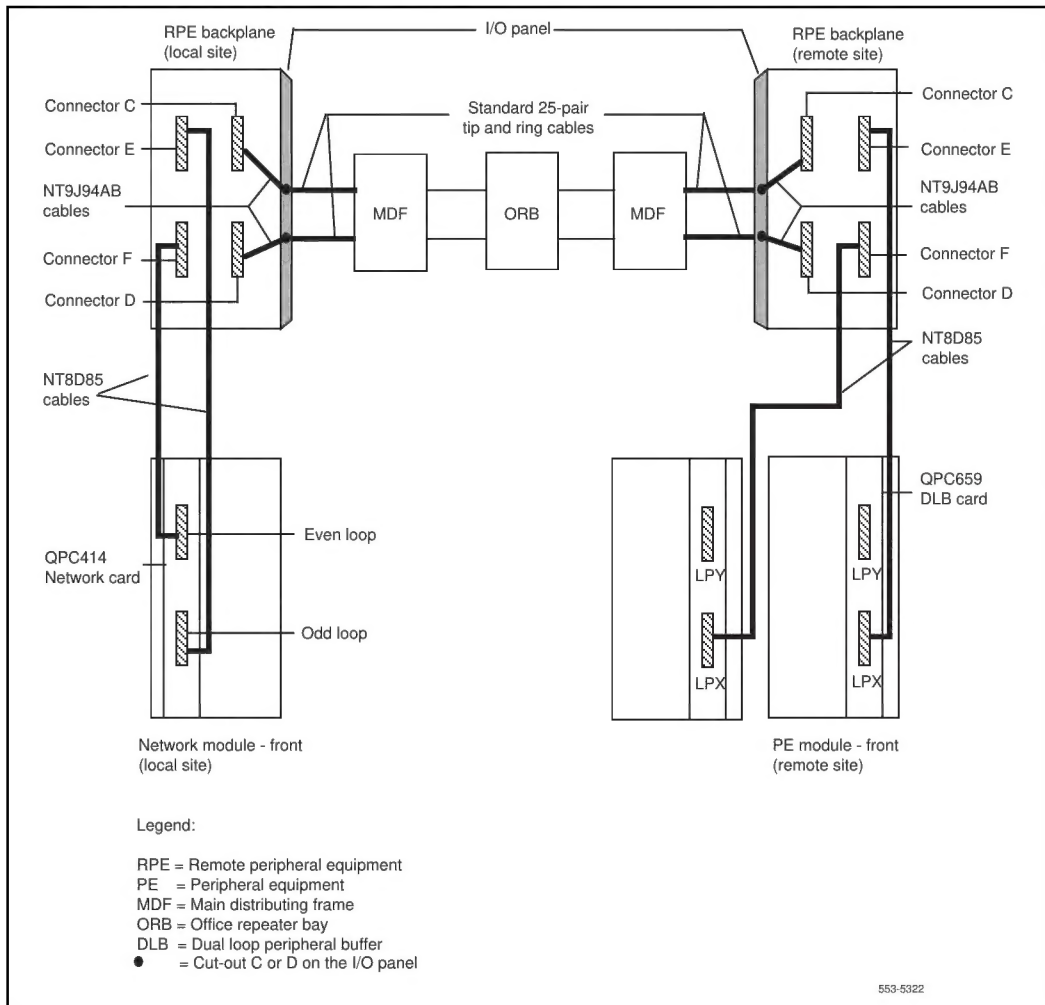


Figure 140 shows the RPE connection to an existing SL-1 cabinet using external shielded cables. It also shows the connection to the MDF and the remote site where the RPE is connected to the PE modules.

Figure 140
RPE cabling to an SL-1 cabinet and PE modules

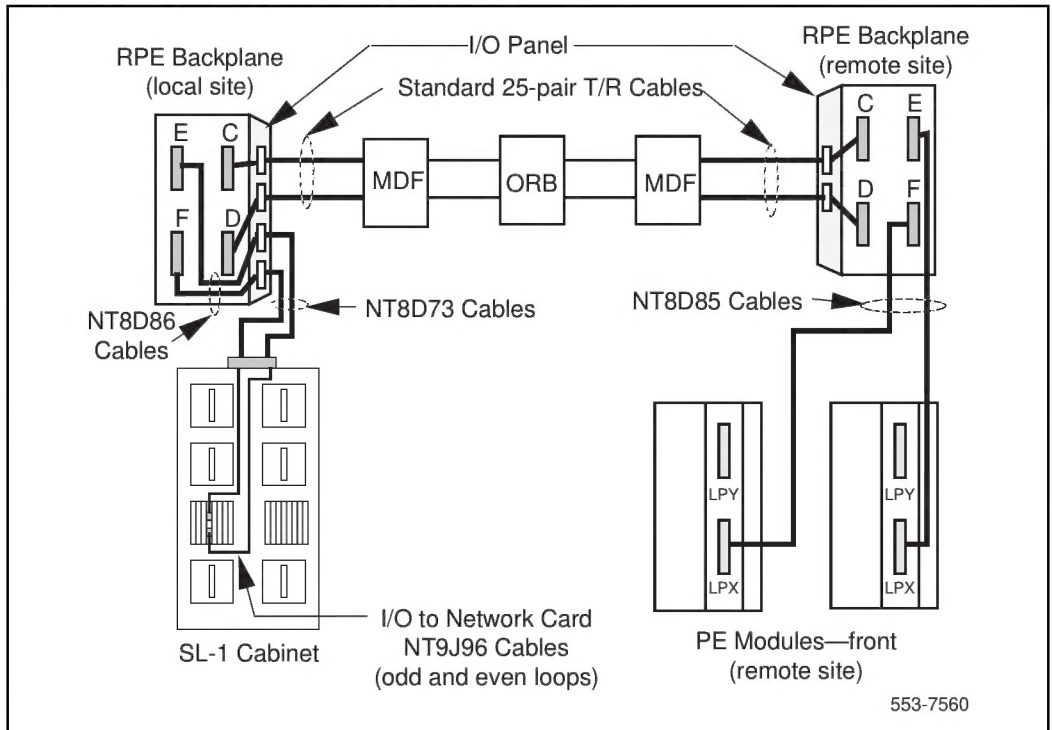
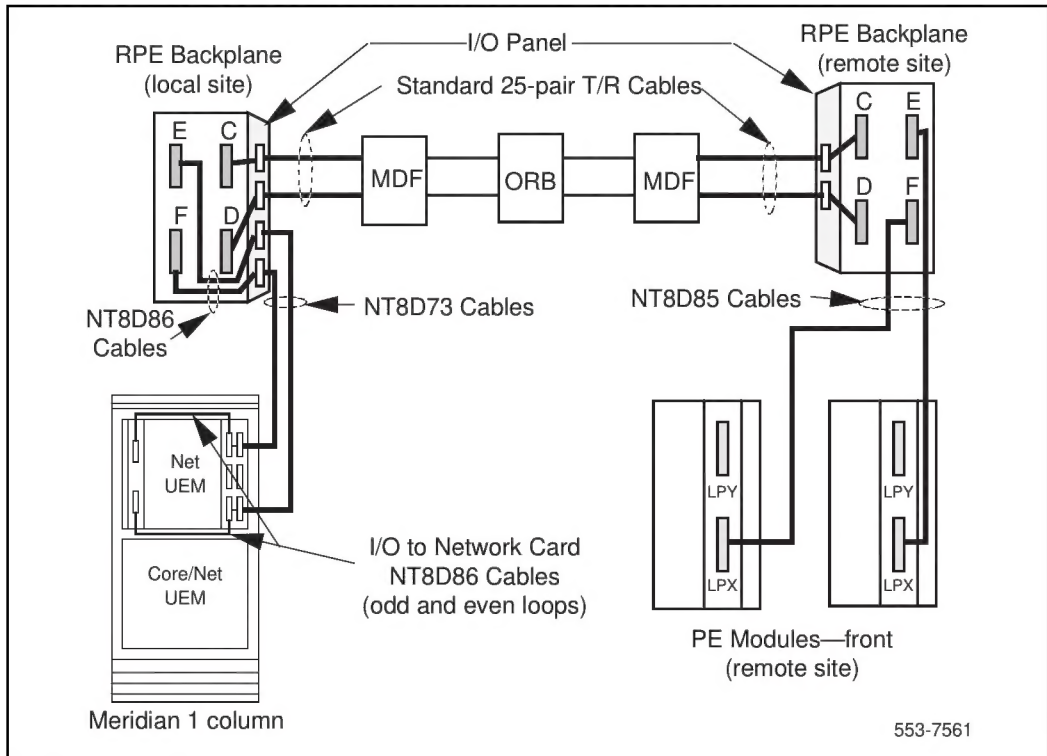


Figure 141 shows the RPE connection to an existing Meridian 1 column using external shielded cables. It also shows the connection to the MDF and the remote site where the RPE is connected to the PE modules.

Figure 141
RPE cabling to a collocated Meridian 1 column and PE modules



Connections

All cables, except connector C, D, E, and F cables, are terminated and designated as described in *Telephone and attendant console installation* (553-3001-215). Connector C, D, E, and F cable designations are shown in [Tables 103](#) through [106](#).

Telephones and consoles are cross-connected to PE modules as described in *Telephone and attendant console installation* (553-3001-215).

The local and remote RPE Modules are cross-connected to the digital carrier cable pairs, as shown in [Figures 142](#) and [143](#).

The RPE maintenance leads are cross-connected, as shown in [Figure 144](#).

Table 103
Connector C pin assignments (receive signal cable)

Pin number	Lead color	Signal name
C-1	BL-W	C1A
C-2	O-W	C3A
C-3	G-W	C9A
C-4	BR-W	C11A
C-5	S-W	OWT
C-6	BL-R	FLT
C-7	O-R	FLWAA
C-8	G-R	WFIT
C-9	DR-R	OWAT
C-10	S-R	FLAT
C-11 through C-24		GND
C-26	W-BL	C2A
C-27	W-O	C4A
C-28	W-G	C10A
C-29	W-BR	C12A
C-30	W-S	OWR
C-31	R-BL	FLR
C-32	R-O	FLWBA
C-33	R-G	WFIR
C-34	R-DR	OWAR
C-35	R-S	FLAR
C-36 through C-49		GND

Table 104
Connector D pin assignments (transmit signal cable)

Pin number	Lead color	Signal name
D-1	BL-W	C5A
D-2	O-W	C7A
D-3	G-W	C13A
D-4	BR-W	C15A
D-5	S-W	GND
D-6	BL-R	PFT1
D-7	O-R	PFT3
D-8	G-R	DCST
D-9	BR-R	DETT
D-10 through D-24		GND
D-26	W-BL	C6A
D-27	W-O	C8A
D-28	W-G	C14A
D-29	W-BR	C16A
D-30	W-S	GND
D-31	R-BL	PFT5
D-32	R-O	PFT6
D-33	R-G	DCSR
D-34	B-BR	DETR
D-35 through D-49		GND

Table 105
Connector E pin assignments

Pin number	Signal name	Pin number	Signal name
E-1	-SEN02	E-19	SEN02
E-2	-SEN12	E-20	SEN12
E-3	-SEN22	E-21	SEN22
E-4	-SEN32	E-22	SEN32
E-5	LPIN02	E-23	-LPIN02
E-6	LPIN12	E-24	-LPIN12
E-7	LPIN22	E-25	-LPIN22
E-8	LPIN32	E-26	-LPIN32
E-9	LN02	E-27	-LN02
E-10	LN12	E-28	-LN12
E-11	CN22	E-29	-CN22
E-12	CN32	E-30	-CN32
E-13	CN42	E-31	-CN42
E-14	CN52	E-32	-CN52
E-15	MFSS2	E-33	-MFSS2
E-16	-BYP2	E-34	BYP2
E-17	M42	E-35	-M42
E-18	LP02	E-36	-LP02

Table 106
Connector F pin assignments

Pin number	Signal name	Pin number	Signal name
F-1	-SEN01	F-19	SEN01
F-2	-SEN11	F-20	SEN11
F-3	-SEN21	F-21	SEN21
F-4	-SEN31	F-22	SEN31
F-5	LPIN01	F-23	-LPIN01
F-6	LPIN11	F-24	-LPIN11
F-7	LPIN21	F-25	-LPIN21
F-8	LPIN31	F-26	-LPIN31
F-9	LN01	F-27	-LN01
F-10	LN11	F-28	-LN11
F-11	CN21	F-29	-CN21
F-12	CN31	F-30	-CN31
F-13	CN41	F-31	-CN41
F-14	CN51	F-32	-CN51
F-15	MFSS1	F-33	-MFSS1
F-16	-BYP1	F-34	BYP1
F-17	M41	F-35	-M41
F-18	LP01	F-36	-LP01

Figure 142
Local-to-remote RPE cross-connections

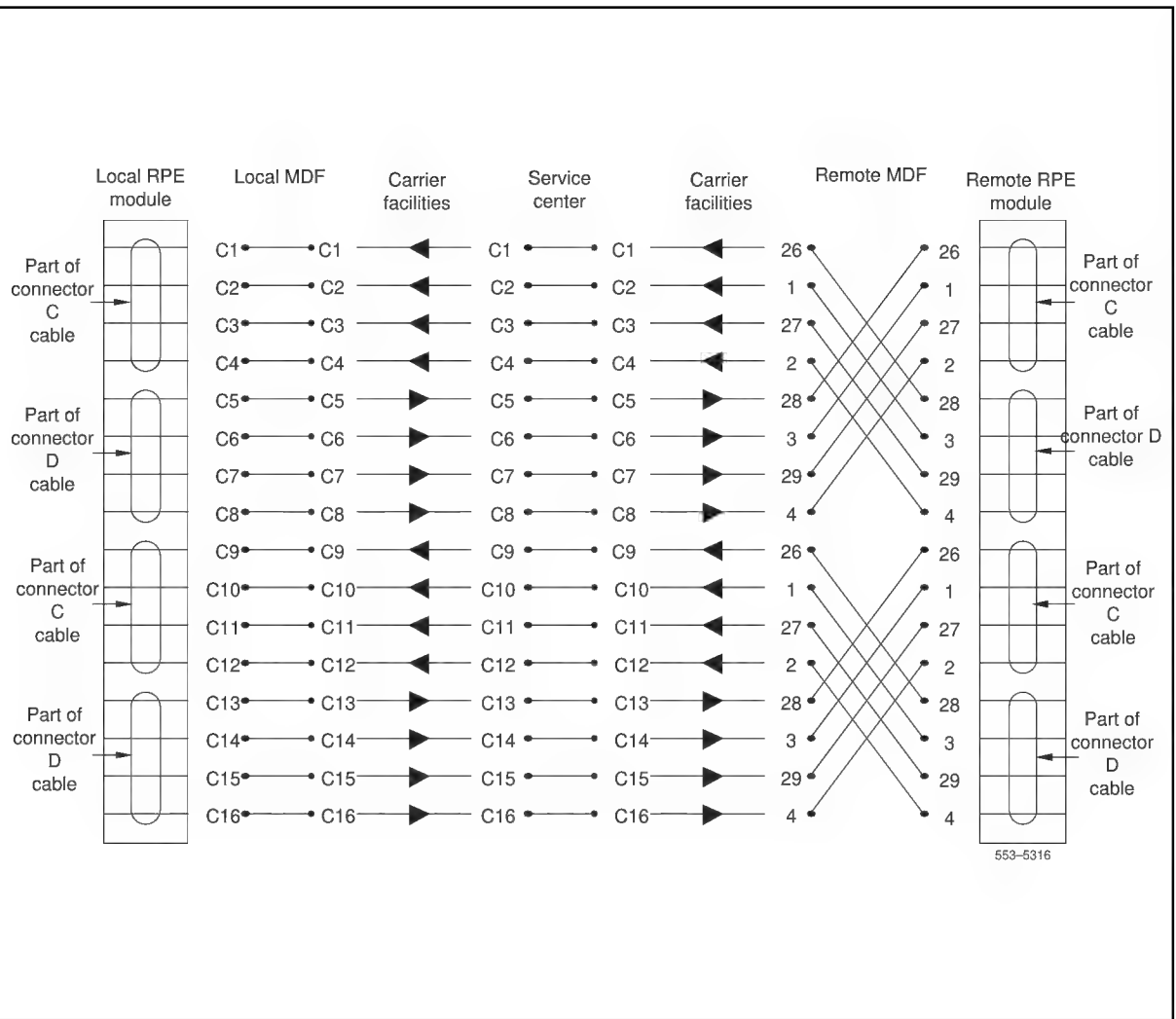


Figure 143
MDF cross-connections

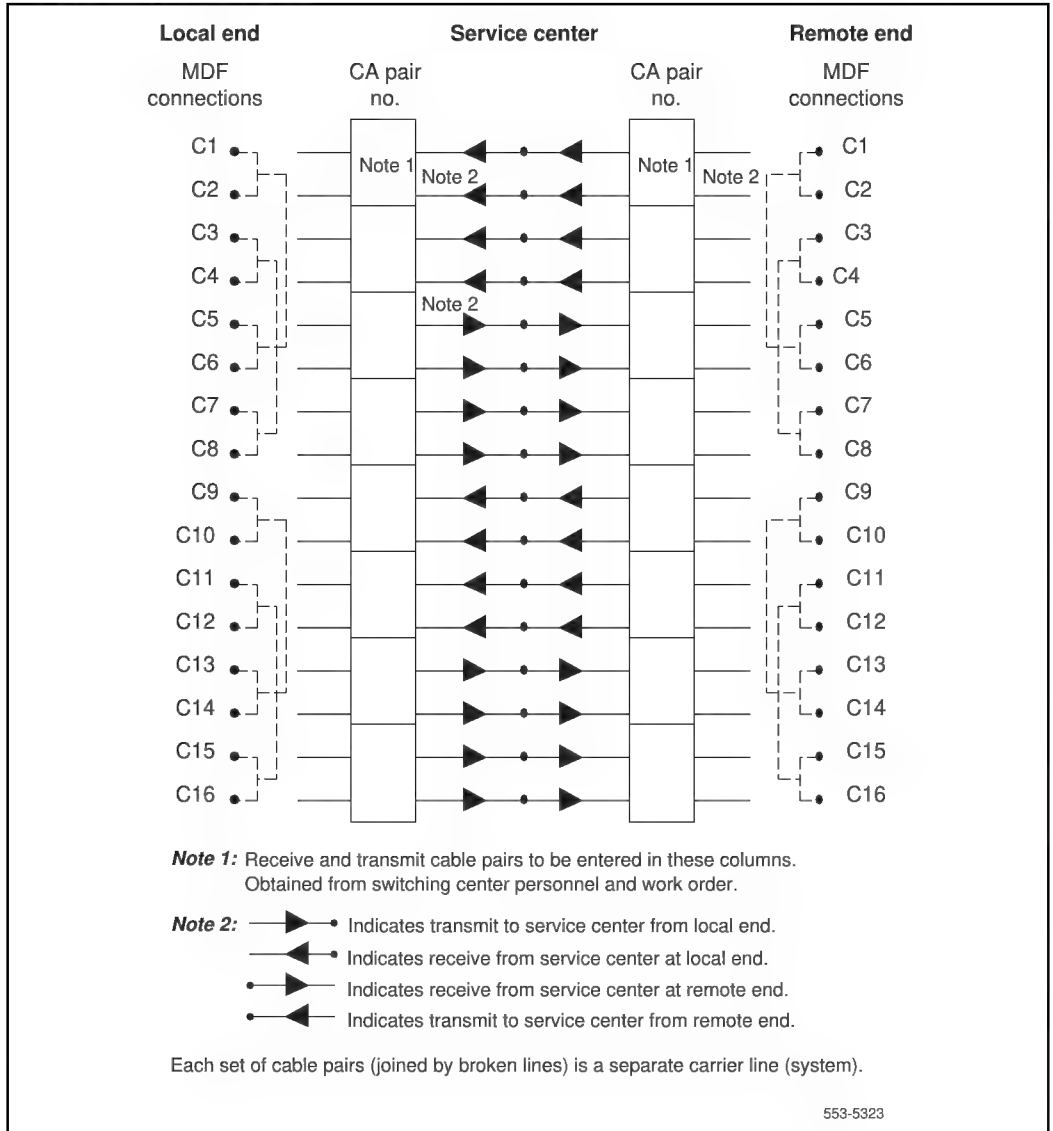


Figure 144
Maintenance lead cross-connections (Part 1 of 2)

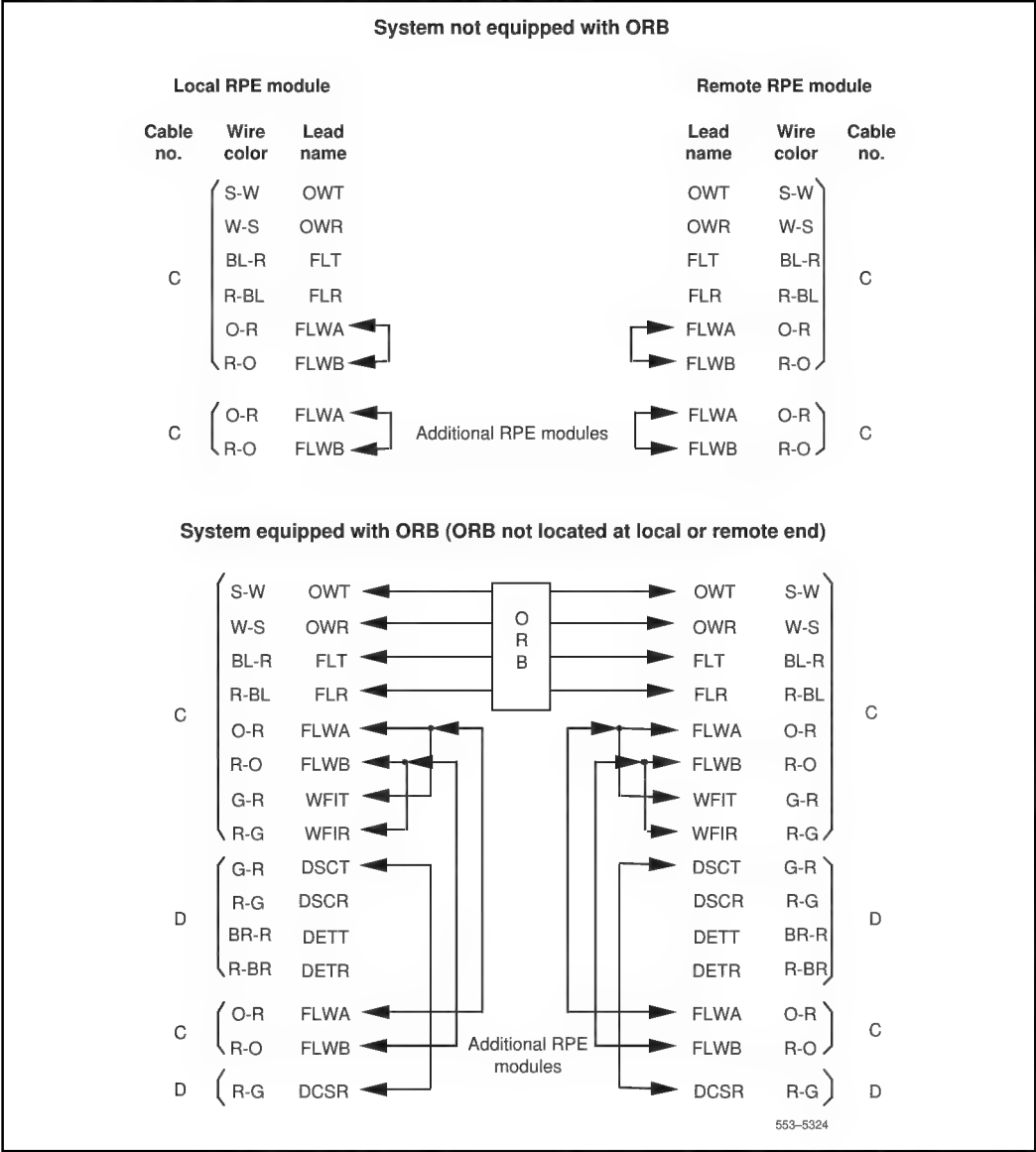
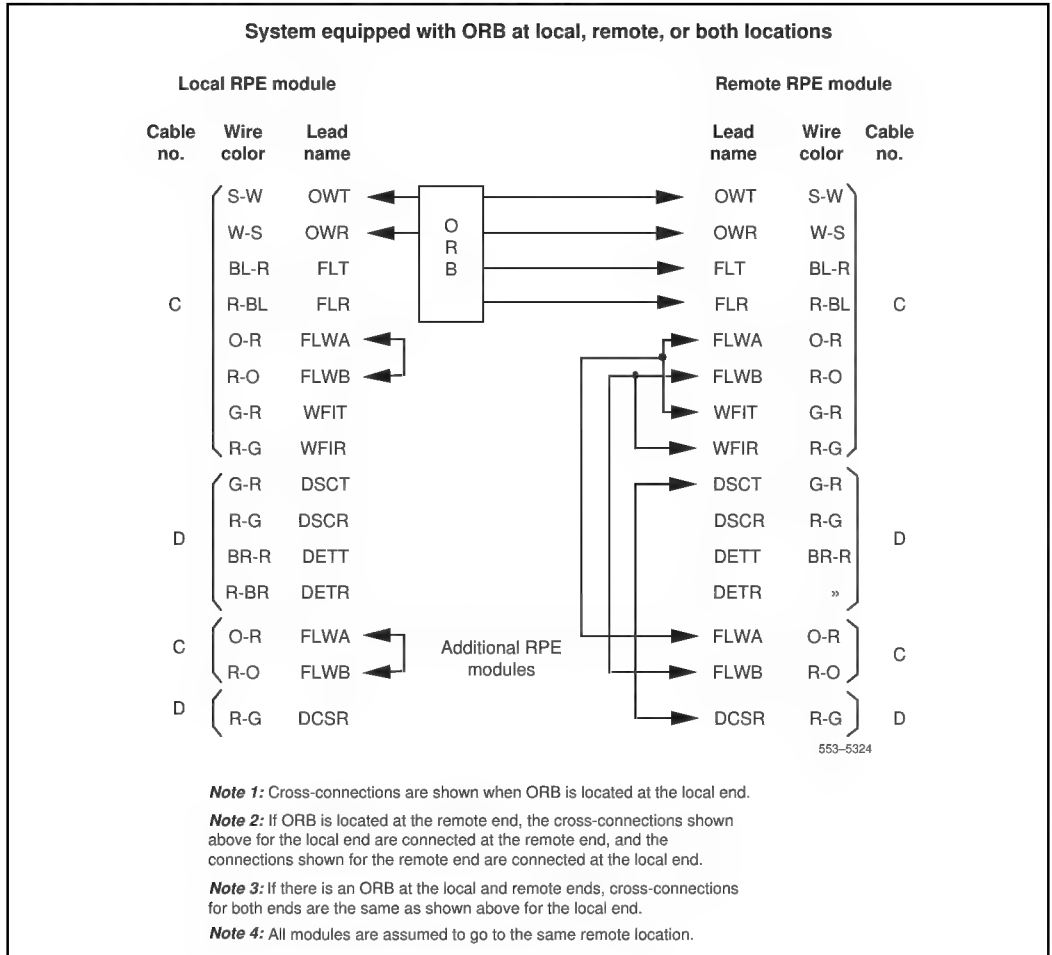


Figure 144
Maintenance lead cross-connections (Part 2 of 2)



RPE option switch settings

Verify the switch settings on all of the cards listed in this chapter.

QPC62 1.5M Baud Converter Card

Use QPC62F or later vintage. Set the switches on the card (see [Figure 145](#)) according to [Table 107](#).

Figure 145
QPC62 option switch and header pin locations

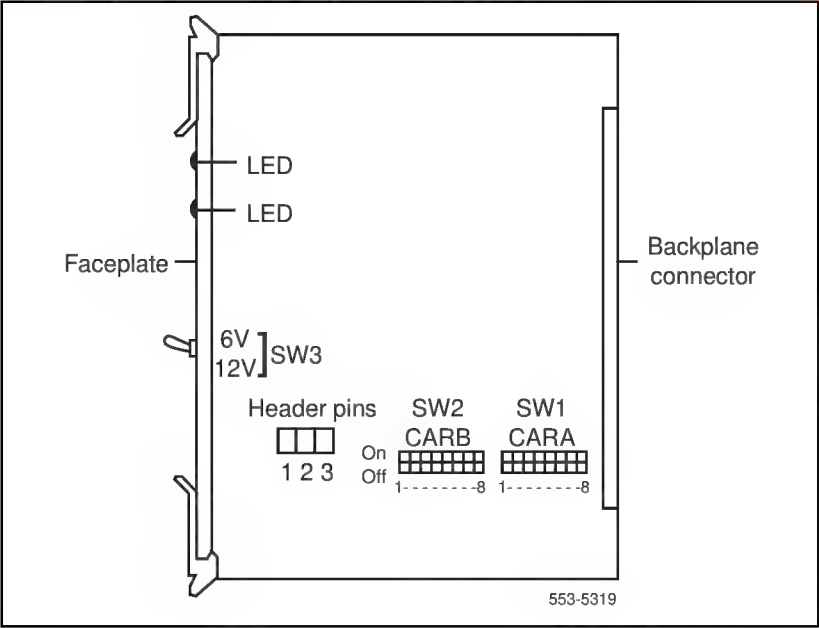


Table 107
QPC62 switch settings

Carrier A & B options* distance to ORB		Switch settings** SW1 and SW2								SW3
Feet	Meters	1	2	3	4	5	6	7	8	
0 – 150***	0 – 45	off	off	on	on	off	on	on	off	6 V
151 – 450	146 – 147	off	on	on	off	on	on	off	on	12 V
451 – 750	448 – 229	on	off	off	on	on	off	on	on	12 V

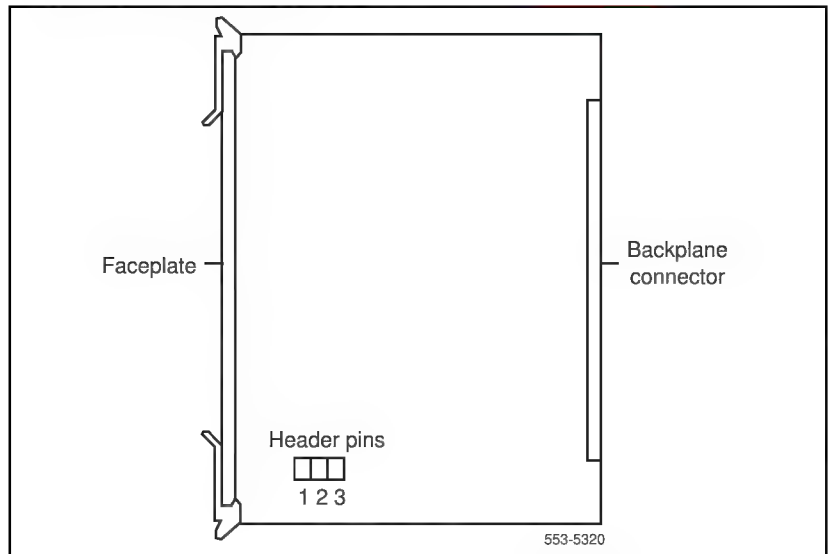
* Insert the plug-in jumper (U-link) between header pins 1 and 2 (located at B25).

** Switch 1 (SW1) is for carrier A; Switch 2 (SW2) is for Carrier B. SW3 is the faceplate toggle switch.

*** Set the card for 0–45 m (0–150 ft) when interfacing directly with the carrier (not through an ORB).

QPC66 2M Baud Converter Card

Use QPC66E or later vintage. Insert the plug-in jumper (U-link) between header pins 1 and 2 located at B35 (see [Figure 146](#)).

Figure 146
QPC66 header pin strapping

QPC99 Carrier Interface Card

Use QPC99F or later vintage. Set the switches on the card (see [Figure 147](#)) according to [Tables 108](#) and [109](#).

Figure 147
QPC99 option switch locations

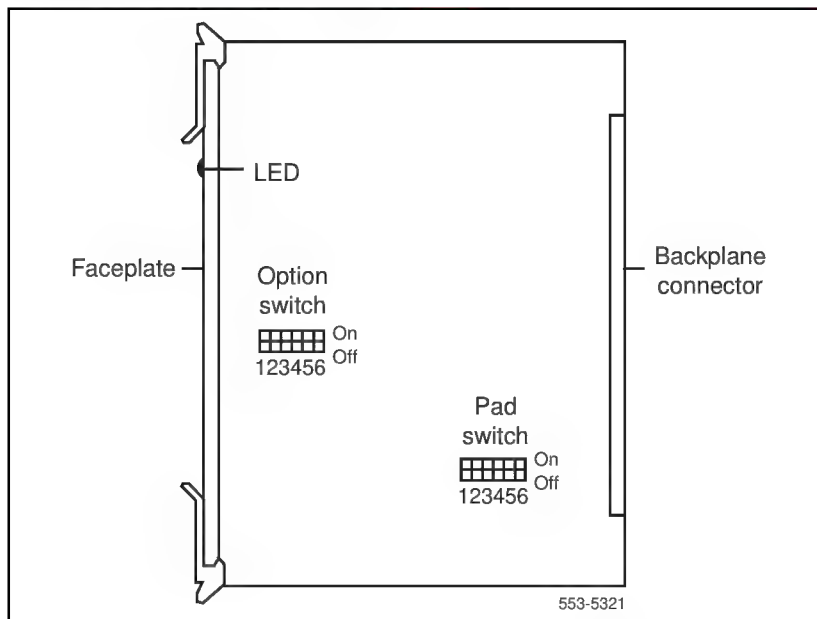


Table 108
QPC99 A20 switch and F25 pad switch

Carrier location	Interface equipment	A20 switch						F25 pad switch					
		1	2	3	4	5	6	7	8	9	10	11	12
Local	ORB at local end (pads in)	off	off	off	on	off	on	on	on	on	on	off	off
	Direct to LD-1 or GTE carrier (no ORB at local end) (pads out)	off	off	off	on	on	on	off	off	off	off	on	on
	ORB at remote end (pads in)	on	off	on	off	off	on	on	on	on	on	off	off
	Direct to LD-1 or GTE carrier (no ORB at remote end) (pads out)	on	off	on	off	on	on	off	off	off	off	on	on
Note: Consult manufacturer for switch settings if card interfaces with other type of carrier equipment.													

Table 109
QPC99 S2 switch

Carrier location	Interface equipment	SW2					
		1	2	3	4	5	6
Local	ORB at local end (pads in)	off	off	off	off	on	on
	Direct to LD-1 or GTE carrier (no ORB at local end) (pads out)	on	on	on	on	off	off
Remote	ORB at remote end (pads in)	off	off	off	off	on	on
	Direct to LD-1 or GTE carrier (no ORB at remote end) (pads out)	on	on	on	on	off	off

NT8D22 System Monitor

At the remote location, set all system monitors as slaves, as shown in the following [Tables 110](#) and [111](#).

Table 110
NT8D22 System Monitor switch settings for slaves

Switch	1	2	3	4	5	6	7	8
SW1	off	off	*	**	off	off	off	off
SW2	off	off	To set positions 3-8, see Table 111					
SW3	off	off	off	off				
* Set to on for DC systems; set to off for AC systems. ** Set to on to enable PFTU (if equipped) during over-temperature condition. Set to off to disable PFTU during over-temperature condition.								

Table 111
SW2 on each slave—unit number for the slave

Slave unit address	Switch position						Slave unit address	Switch position					
	3	4	5	6	7	8		3	4	5	6	7	8
1	on	on	on	on	on	off	33	off	on	on	on	on	off
2	on	on	on	on	off	on	34	off	on	on	on	off	on
3	on	on	on	on	off	off	35	off	on	on	on	off	off
4	on	on	on	off	on	on	36	off	on	on	off	on	on
5	on	on	on	off	on	off	37	off	on	on	off	on	off
6	on	on	on	off	off	on	38	off	on	on	off	off	on
7	on	on	on	off	off	off	39	off	on	on	off	off	off
8	on	on	off	on	on	on	40	off	on	off	on	on	on
9	on	on	off	on	on	off	41	off	on	off	on	on	off
10	on	on	off	on	off	on	42	off	on	off	on	off	on
11	on	on	off	on	off	off	43	off	on	off	on	off	off
12	on	on	off	off	on	on	44	off	on	off	off	on	on
13	on	on	off	off	on	off	45	off	on	off	off	on	off
14	on	on	off	off	off	on	46	off	on	off	off	off	on
15	on	on	off	off	off	off	47	off	on	off	off	off	off
16	on	off	on	on	on	on	48	off	off	on	on	on	on
17	on	off	on	on	on	off	49	off	off	on	on	on	off
18	on	off	on	on	off	on	50	off	off	on	on	off	on
19	on	off	on	on	off	off	51	off	off	on	on	off	off
20	on	off	on	off	on	on	52	off	off	on	off	on	on
21	on	off	on	off	on	off	53	off	off	on	off	on	off
22	on	off	on	off	off	on	54	off	off	on	off	off	on
23	on	off	on	off	off	off	55	off	off	on	off	off	off
24	on	off	off	on	on	on	56	off	off	off	on	on	on
25	on	off	off	on	on	off	57	off	off	off	on	on	off
26	on	off	off	on	off	on	58	off	off	off	on	off	on
27	on	off	off	on	off	off	59	off	off	off	on	off	off
28	on	off	off	off	on	on	60	off	off	off	off	on	on
29	on	off	off	off	on	off	61	off	off	off	off	on	off
30	on	off	off	off	off	on	62	off	off	off	off	off	on
31	on	off	off	off	off	off	63	off	off	off	off	off	off
32	off	on	on	on	on	on							

Performing acceptance tests

After RPE installation, several tests are performed to verify that the equipment functions properly.

Testing equipment

Test the following:

- To test LD-1 carrier equipment, see *Initial lineup and installation tests* (368-2101-200).
- To test network loops:
 - Load the RPE Diagnostic Program:

LD 33

LOOP L “L” is the loop number

If the response is **OK**, no faults are detected.

Note: With RPE, include LD 33 in the midnight routines.

- Switch primary carriers on loop L:

SCAR L

Enter loop number again

LOOP L

Note: If any connection memory or channel faults are detected, the affected channel is disabled. See LD 30 to interpret system messages.

- To test telephones, attendant consoles, and add-on modules, see *Telephone and attendant console installation* (553-3001-215).

Note: If outgoing trunks are ground start, lift the receiver and momentarily press the ground start button on the 500 telephone.

Testing transmission quality

Test RPE transmission quality through the monitoring facilities built into the QPC99 Carrier Interface Card (see [Figure 148](#)). There are four jacks on the front of the QPC99 card:

- ROUT A and ROUT B are input jacks for channels A and B, respectively.
- MON A and MON B are output jacks that monitor the regenerated signal. Connect a test set to a MON jack at any time to test transmission quality.

Check transmission by closing the MLP switch at the rear end, injecting a test signal at the ROUT jack, and monitoring the output at a remote end MON jack. Use this procedure to check the transmission path in both directions.

Locating span line faults

The typical repeatered line maintenance arrangement (see [Figure 149](#)) includes a series of fault locating filters and a fault locating cable pair installed in each span line:

- One fault locating filter is used for all repeaters installed in a single housing (maximum 25 two-way repeaters in a single housing).
- A filter with a different audio center frequency is installed in each repeater housing in the span line.

The fault locating filter is a narrow band selective filter centered at one of 12 audio frequencies. The output of each repeater in the housing is bridged across the input of the respective fault locating filter. The outputs of all filters in a span are connected to the common fault locating cable pair. This arrangement permits checking each repeater in a span from either span terminal, using a test signal with an audio frequency component corresponding to the center frequency of the respective fault locating filter.

When a span line produces excessive errors or a failure occurs, perform a fault locating test to locate the defective repeater. The fault locating test uses a Pulse Code Modulation (PCM) line and repeater test set (Lear Seigler Sierra 415A or equivalent). To perform the fault locating test, remove the line from service and connect the test set to the line at the span terminal. Connect the output of the test set transmit section to the span line; connect the receive section input to the corresponding fault locating jack.

A series of test pulses with an audio-frequency component is transmitted down the line. The audio-frequency component is selected to correspond to each of the fault-locating filters in the span. This audio-frequency component appears in the output of each repeater in the span. However, a portion of this signal filters through the appropriate associated fault locating filter and returns to the test set over the fault locating pair.

The amplitude of the test signal is measured on the decibel meter and is a function of the performance of the repeater under the various test signal conditions. If a repeater has failed completely, no test signal is returned to the test set. By changing the audio-frequency component, each repeater in a span can be tested until the faulty or marginal repeater is located.

Figure 148
QPC99 maintenance jacks and looping switches

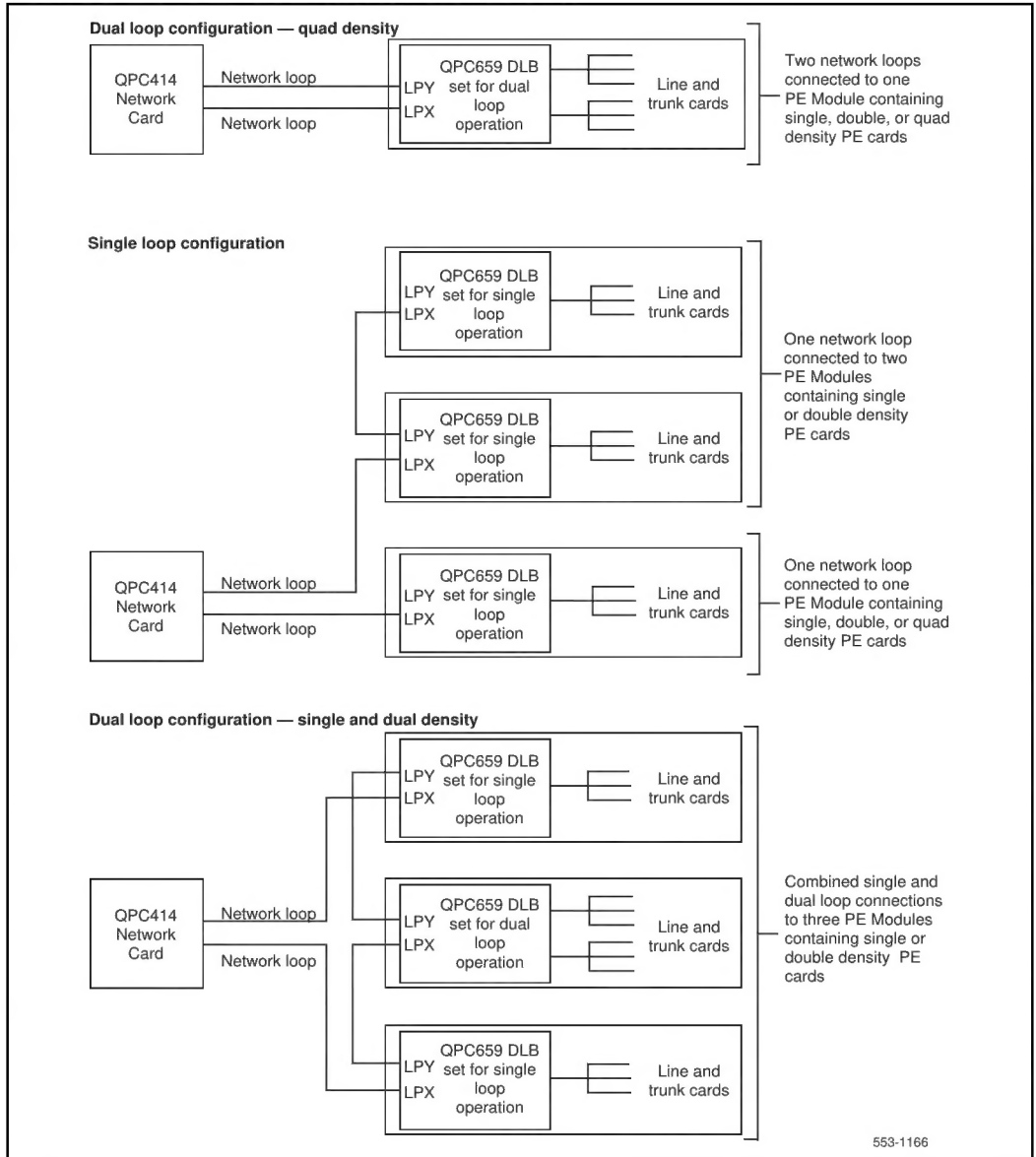


Figure 149
Typical span line fault locating arrangement

